

P A T E N T

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application for
Reissue of:

Patent of	:	Dennis J. Cronin et al.)	
)	
Patent No.	:	6,320,511)	Group Art Unit:
)	2632
Appl. No.	:	09/724,101)	
)	
Filed	:	November 28, 2000)	Examiner:
)	Phung Nguyen
For	:	ICE DETECTOR CONFIGURATION)		
		FOR IMPROVED ICE DETECTION)		
		AT NEAR FREEZING)	
		CONDITIONS)	
)	
Our File	:	B04.12-0067)	

DECLARATION OF DENNIS J. CRONIN, Ph.D.

I, Dennis J. Cronin, Ph.D., a citizen of the United States of America, residing at 1991 Alden Avenue, Shakopee, MN 55379, hereby declare that:

1. I am co-inventor of the subject matter claimed in U.S. Patent No. 6,320,511 to Cronin et al, issued November 20, 2001 entitled ICE DETECTOR CONFIGURATION FOR IMPROVED ICE DETECTION AT NEAR FREEZING CONDITIONS for which we solicit a reissue pursuant to 35 U.S.C. § 251

2. I have reviewed and fully understand the contents of the above-referenced patent, including the specification, original claims, and the amended claims 1, 17, 18 and new claims 19 and 20 presented in the accompanying Preliminary Amendment, which I have

reviewed. I believe the named inventors to be the first and original inventors of the subject matter which is claimed and for which a reissue is sought. I acknowledge my duty to disclose information which may be material to examination of this application for reissue.

3. I believe our original patent to be wholly or partly inoperative because we claimed more than we had a right to claim in the original patent in certain aspects, and less than we had a right to claim in other aspects. I believe the claims in our original patent do not reflect the correct breadth of our invention in relation to prior art for the reasons set forth below. I believe that amended claims 1, 17, and 18, in the accompanying preliminary amendment, and newly added claims 19 and 20, properly and correctly define the scope of our invention.

4. All errors corrected in this reissue application up to the date of filing this declaration arose without deceptive intent on my part.

5. The claims in our original U.S. Patent No. 6,320,511 are directed to an apparatus and method for determining icing conditions at near freezing conditions. The invention described therein is particularly adapted for use on aircraft and other aerospace vehicles. Prior art ice detectors on aircraft have shown particular and undesirable performance characteristics during operation at aircraft angles of attack generally greater than five degrees (5°). As is well known in the art, the angle of attack is a measurement of the angle between the undisturbed

airflow direction and a reference axis. With respect to an airplane in flight, the reference axis is typically the wing chord (the two dimensional plane connecting the leading edge of the wing and the trailing edge of the wing).

6. The theory underlying the invention described in U.S. Patent No. 6,320,511 is to provide an ice detecting probe configured and positioned so that during use on an aircraft in flight, the probe will have regions of its surface at a lower air pressure, (resulting in lower temperature), than the associated aircraft structure on which the probe is mounted. Prior art probes used for ice detection, such as those having simple cylindrical cross sectional shape, are known to have areas of lower pressure than the support structure on which it is mounted only if the angle of attack is below about 5° depending on the wing geometry. The pressure coefficient is above -3 for a circular cylinder, so at angles of attack greater than the angle of attack at which the pressure coefficient of the wing is less than -3, the prior art designs do not, generally, perform as needed. This is a deficiency addressed by this invention.

7. We discovered that the airfoil shape ice detector of the present invention, when mounted on and used on an aircraft, has regions of lower pressure and lower pressure coefficient and thus lower temperature at angles of attack across the expected operational range of an aircraft. This is shown in Figure 3 of our patent. Figure 3 also shows that, in the example problem, above angles of attack of about 5° , when pressure coefficients are less than about -3, the prior art ice detectors do not work

in the intended manner, i.e., ice could form on the aircraft wing before it forms on the ice detector. The use of the preferred embodiment of this invention (an airfoil shaped ice detector) or one of the alternative embodiments (a cylindrical shaped ice detector preceded or followed by a generally planar body member) provides successful and timely detection of ice both below and above the example 5° angle of attack threshold, and both below and above angles of attack where the pressure coefficient of the wing is about -3.

8. Claim 1 of our original patent failed to provide the distinction that airfoil cross sectional probe shapes are necessary for obtaining regions of lower pressure on a surface portion of the probe assembly across a higher range of angles of attack (as compared to prior art probes); it also failed to distinguish that at low angles of attack with a pressure coefficient on the wing greater than -3, lower pressure surface portions could be present with prior art cylindrical or similarly shaped ice detector probes. Similarly, claim 17 did not recite the airfoil cross sectional shape of the probe, and would possibly cover the prior art cylindrical probes that provided lower pressure surface areas at low angles of attack of the associated airfoil. Patent claims 2 and 8 included proper definitions of our invention.

9. As outlined above, the failure to provide limitations distinguishing either (i) the cross sectional shape of the probe that provided the desired reduced pressure and thus reduced

temperature on probe surface portions, or (ii) that the probe developed a pressure coefficient less than -3 at operational angles of attack resulted in the claims failing to clearly distinguish the invention from inherent operation of prior art ice detectors.

10. Claim 1 as amended in the preliminary amendment filed herewith includes a probe with an airfoil shape cross section with a rounded section facing in the direction of airflow, and comprises the preferred ice detector configuration disclosed in the specification of U.S. Patent No. 6,320,511.

11. The subject matter of original patent claim 1 has been combined with the general subject matter of original patent claim 2 and re-written and as reissue application Claim 19. Claim 19 includes a body member positioned adjacent to at least one of the upstream and downstream sides of the probe assembly, and wherein the added body member permits positioning the probe assembly in a manner so that at selected angles of attack, icing will occur on the probe assembly for detection of such ice prior to ice forming on the structure on which the probe is mounted.

12. New claim 20 has been added to define the probe structure as being effective at times when the pressure coefficient on the wing is less than about -3, as disclosed in the patent specification and in Figure 3 of the patent drawings.

13. The errors were not discovered until it was brought to the attention of the assignee and the undersigned by a third party that the claims 1 and 17 of Patent 6,320,511 may have been broad enough to include existing cylindrical probes.

14. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both under 35 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon. All statements made herein based on my own knowledge are true and all statements made herein based on information and belief are believed to be true.

Date: 2 Sept 2003


Dennis J. Cronin, Ph.D.

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		AT NEAR FREEZING)	
		CONDITIONS)	
)	
Our File	:	B04.12-0067)	

DECLARATION OF DARREN G. JACKSON

I, Darren G. Jackson, a citizen of the United States of America, residing at 14435 Edgewood Avenue, Savage, MN 55378, hereby declare that:

1. I am co-inventor of the subject matter claimed in U.S. Patent No. 6,320,511 to Cronin et al, issued November 20, 2001 entitled ICE DETECTOR CONFIGURATION FOR IMPROVED ICE DETECTION AT NEAR FREEZING CONDITIONS for which we solicit a reissue pursuant to 35 U.S.C. § 251.

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reviewed. I believe the named inventors to be the first and original inventors of the subject matter which is claimed and for which a reissue is sought. I acknowledge my duty to disclose information which may be material to examination of this application for reissue.

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airflow direction and a reference axis. With respect to an

airplane in flight, the reference axis is typically the wing chord (the two dimensional plane connecting the leading edge of the wing and the trailing edge of the wing).

6. The theory underlying the invention described in U.S. Patent No. 6,320,511 is to provide an ice detecting probe configured and positioned so that during use on an aircraft in flight, the probe will have regions of its surface at a lower air pressure, (resulting in lower temperature), than the associated aircraft structure on which the probe is mounted. Prior art probes used for ice detection, such as those having simple cylindrical cross sectional shape, are known to have areas of lower pressure than the support structure on which it is mounted only if the angle of attack is below about 5° depending on the wing geometry. The pressure coefficient is above -3 for a circular cylinder, so at angles of attack greater than the angle of attack at which the pressure coefficient of the wing is less than -3, the prior art designs do not, generally, perform as needed. This is a deficiency addressed by this invention.

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above angles of attack of about 5° , when pressure coefficients are less than about -3, the prior art ice detectors do not work in the intended manner, i.e., ice could form on the aircraft wing before it forms on the ice detector. The use of the preferred embodiment of this invention (an airfoil shaped ice detector) or one of the alternative embodiments (a cylindrical shaped ice detector preceded or followed by a generally planer body member) provides successful and timely detection of ice both below and above the example 5° angle of attack threshold, and both below and above angles of attack where the pressure coefficient of the wing is about -3.

8. Claim 1 of our original patent failed to provide the distinction that airfoil cross sectional probe shapes are necessary for obtaining regions of lower pressure on a surface portion of the probe assembly across a higher range of angles of attack (as compared to prior art probes); it also failed to distinguish that at low angles of attack with a pressure coefficient on the wing greater than -3, lower pressure surface portions could be present with prior art cylindrical or similarly shaped ice detector probes. Similarly, claim 17 did not recite the airfoil cross sectional shape of the probe, and would possibly cover the prior art cylindrical probes that provided lower pressure surface areas at low angles of attack of the associated airfoil. Patent claims 2 and 8 included proper definitions of our invention.

9. As outlined above, the failure to provide limitations distinguishing either (i) the cross sectional shape of the probe

that provided the desired reduced pressure and thus reduced temperature on probe surface portions, or (ii) that the probe developed a pressure coefficient less than -3 at operational angles of attack resulted in the claims failing to clearly distinguish the invention from inherent operation of prior art ice detectors.

10. Claim 1 as amended in the preliminary amendment filed herewith includes a probe with an airfoil shape cross section with a rounded section facing in the direction of airflow, and comprises the preferred ice detector configuration disclosed in the specification of U.S. Patent No. 6,320,511.

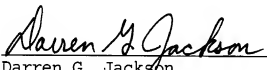
11. The subject matter of original patent claim 1 has been combined with the general subject matter of original patent claim 2 and re-written and as reissue application Claim 19. Claim 19 includes a body member positioned adjacent to at least one of the upstream and downstream sides of the probe assembly, and wherein the added body member permits positioning the probe assembly in a manner so that at selected angles of attack, icing will occur on the probe assembly for detection of such ice prior to ice forming on the structure on which the probe is mounted.

12. New claim 20 has been added to define the probe structure as being effective at times when the pressure coefficient on the wing is less than about -3 , as disclosed in the patent specification and in Figure 3 of the patent drawings.

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Date: 9-2-03


Darren G. Jackson

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For	:	ICE DETECTOR CONFIGURATION)		
		FOR IMPROVED ICE DETECTION)		
		AT NEAR FREEZING)	
		CONDITIONS)	
)	
Our File	:	B04.12-0067)	

DECLARATION OF DAVID G. OWENS

I, David G. Owens, a citizen of the United States of America, residing at 7656 W. 84th Street, Bloomington, MN 55438, hereby declare that:

1. I am co-inventor of the subject matter claimed in U.S. Patent No. 6,320,511 to Cronin et al, issued November 20, 2001 entitled ICE DETECTOR CONFIGURATION FOR IMPROVED ICE DETECTION AT NEAR FREEZING CONDITIONS for which we solicit a reissue pursuant to 35 U.S.C. § 251.

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12. New claim 20 has been added to define the probe structure as being effective at times when the pressure coefficient on the wing is less than about -3, as disclosed in the patent specification and in Figure 3 of the patent drawings.

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Date: 18 August 2003


David G. Owens

Express Mail No.: EV178021108US

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		AT NEAR FREEZING)	
		CONDITIONS)	

ASSENT OF ASSIGNEE TO REISSUE,
AND POWER OF ATTORNEY

Commissioner of Patents
Washington D.C. 20231

Sir:

Rosemount Aerospace Inc., owner of the entire right, title and interest in United States Letters Patent No. 6,320,511, granted on November 20, 2001, by assignment from all of the inventors, as identified below hereby assents to the above referenced application for reissue.

Rosemount Aerospace Inc. hereby revokes all former Powers of Attorney and appoints the following attorneys and/or agents: Nickolas E. Westman, Reg. No. 20,147; Judson K. Champlin, Reg. No. 34,797; Joseph R. Kelly, Reg. No. 34,847; Steven M. Koehler, Reg. No. 36,188; David D. Brush, Reg. No. 34,557; John D.

Veldhuis-Kroeze, Reg. No. 38,354; Deirdre Megley Kvale, Reg. No. 35,612; Theodore M. Magee, Reg. No. 39,758; Christopher R. Christenson, Reg. No. 42,413; Brian D. Kaul 41,885; Robert M. Angus, Reg. No. 24,383; Christopher L. Holt, Reg. No. 45,844; Alan G. Rego, Reg. No. 45,956; David C. Bohn, Reg. No. 32,015; Linda P. Ji, Reg. No. 49,027; Todd R. Fronek, Reg. No. 48,516; Nathan M. Rau, Reg. No. 45,466; Leanne R. Taveggia, Reg. No. 53,675; Z. Peter Sawicki, Reg. No. 30,214; and Peter J. Ims, Reg. No. 48,774 full power of substitution and revocation to prosecute said reissue application, to make alteration and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith.

Pursuant to 37 C.F.R. § 3.73(b), Rosemount Aerospace Inc. a corporation of the State of Delaware asserts that it is the assignee of the entire right, title and interest in U.S. patent 6,320,511 identified above by virtue of an assignment from the inventors of the patent application identified above and on which the patent issued. The assignment in the U.S. Patent and Trademark Office was recorded at Reel 011324, Frame 0005, on November 28, 2000.

Please direct all communications to Nickolas E. Westman, WESTMAN, CHAMPLIN & KELLY, P.A. International Centre - Suite 1600, 900 Second Avenue South, Minneapolis MN 55402. Please direct all telephone calls to Nickolas E. Westman at telephone number (612) 334-3222.

ROSEMOUNT AEROSPACE INC.

Date: 8/19/03

By: 

James M. Rashid
Assistant Secretary